

## WHAT IS CLAIMED IS:

1. A heat control apparatus for a circuit comprising:

a heat detecting unit which acquires the heat generation

5 condition of a semiconductor integrated circuit from an

inspection image obtained by capturing an image of the

semiconductor integrated circuit by an image capturing sensor;

and

a cooling control unit which controls a cooling means for

10 cooling the semiconductor integrated circuit in accordance with

the acquired heat generation condition.

2. The heat control apparatus for a circuit according to

claim 1, wherein the heat detecting unit acquires the temperature

15 distribution of the semiconductor integrated circuit from the

inspection image, and, if the temperature exceeds a predetermined

threshold value at any location in the semiconductor integrated

circuit, the cooling control unit enhances the cooling capability

of the cooling means.

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3. A heat control apparatus for a circuit comprising:

a heat detecting unit which acquires the heat generation

condition of a semiconductor integrated circuit from an

inspection image obtained by capturing an image of the

25 semiconductor integrated circuit by an image capturing sensor;

and

an operation control unit for controlling the operating condition of the semiconductor integrated circuit in accordance with the acquired heat generation condition.

5           4. The heat control apparatus for a circuit according to claim 3, wherein the heat detecting unit acquires the temperature distribution of the semiconductor integrated circuit from the inspection image, and, if the temperature exceeds a predetermined threshold value at any location in the semiconductor integrated  
10 circuit, the operation control unit reduces a load per unit time in the location where the temperature exceeds the threshold value.

5. A heat control method for a circuit comprising the steps of:

15           acquiring the heat generation condition of a semiconductor integrated circuit with a high two-dimensional resolution; and  
            exercising control so as to change the heat generation condition of the semiconductor integrated circuit in accordance with the acquired heat generation condition.

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6. A heat control apparatus for a circuit, comprising:  
a transparent cooling mechanism tightly secured to a semiconductor integrated circuit;

an image capturing sensor which captures an image of the  
25 semiconductor integrated circuit through the cooling mechanism;  
a heat detecting unit which acquires the heat generation

condition of the semiconductor integrated circuit from an inspection image captured by the sensor; and

an analyzing unit which analyzes the acquired heat generation condition.

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7. The heat control apparatus for a circuit according to claim 6, wherein the cooling mechanism is a silicon heat spreader and comprises a cooling means for cooling the heat spreader.

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8. A heat control apparatus for a circuit comprising:

a heat spreader formed by extending a silicon substrate in a direction away from a location of heat generation in a semiconductor integrated circuit formed on the silicon substrate;

a cooling apparatus which cools the heat spreader;

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an image capturing sensor which captures an image of the semiconductor integrated circuit;

a heat detecting unit which acquires the heat generation condition of the semiconductor integrated circuit from an inspection image captured by the sensor; and

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an analyzing unit which analyzes the acquired heat generation condition.

9. The heat control apparatus for a circuit according to claim 6, wherein the cooling mechanism is provided with a hollow part and comprises a driving mechanism for causing a coolant to flow in the hollow part.

10. The heat control apparatus for a circuit according to claim 9, wherein the hollow part is provided by boring so as to cover a primary portion of the semiconductor integrated circuit, and an image of the semiconductor integrated circuit is captured by the sensor through the hollow part.

11. The heat control apparatus for a circuit according to claim 9, wherein the hollow part is provided by boring with a predetermined clearance from the semiconductor integrated circuit so that the hollow part is not in the way between the semiconductor integrated circuit and the sensor capturing an image thereof.

12. The heat control apparatus for a circuit according to any of claims 9 through 11, wherein the driving mechanism changes the direction of flow of the coolant as appropriate.

13. The heat control apparatus for a circuit according to claim 12, wherein the analyzing unit synthetically analyzes heat generation conditions detected prior to and subsequent to a change in the direction of flow of the coolant.

14. The heat control apparatus for a circuit according to any of claims 9 through 11, wherein the analyzing unit analyzes the heat generation condition by taking into account temperature

gradient dependent on the direction of flow of the coolant.

15. A heat control apparatus for a circuit comprising:

a cooling mechanism which is provided with a hollow part

5 and which cools a semiconductor integrated circuit; and

a driving mechanism which causes a coolant to flow in the hollow part, wherein

an opening communicating with the hollow part is provided by boring at a predetermined location in the cooling mechanism,

10 at least the edge portion of the opening is tightly secured to a corresponding location in the semiconductor integrated circuit, and the coolant comes into direct contact with at least a portion of the semiconductor integrated circuit via the opening.

15 16. A heat control system for a circuit comprising:

a semiconductor integrated circuit;

an image capturing sensor which captures an image of the semiconductor integrated circuit;

a heat detecting unit which acquires the heat generation condition of the semiconductor integrated circuit from an inspection image obtained by capturing an image of the semiconductor integrated circuit; and

a cooling control unit which controls a cooling means for cooling the semiconductor integrated circuit in accordance with  
25 the acquired heat generation condition.

17. A heat control system for a circuit comprising:

a semiconductor integrated circuit;

an image capturing sensor which captures an image of the semiconductor integrated circuit;

5 a heat detecting unit which acquires the heat generation condition of the semiconductor integrated circuit from an inspection image obtained by capturing an image of the semiconductor integrated circuit; and

an operation control unit which controls the operating  
10 condition of the semiconductor integrated in accordance with the acquired heat generation condition.

18. A heat control system for a circuit comprising:

a semiconductor integrated circuit;

15 a cooling mechanism which is provided with a hollow part and which cools the semiconductor integrated circuit; and

a driving mechanism which causes a coolant to flow in the hollow part, wherein

an opening communicating with the hollow part is provided  
20 by boring at a predetermined location in the cooling mechanism, at least the edge portion of the opening is tightly secured to a corresponding location in the semiconductor integrated circuit, and the coolant comes into direct contact with at least a portion of the semiconductor integrated circuit via the opening.